

REFERENCE 5

**Letter, R.P. Hearn to Distribution
"ANL-West Sanitary Sewage Treatment Expansion
Preliminary Proposal," 1/16/74**

ARGONNE
NATIONAL
LABORATORY

INTRA-LABORATORY MEMO

DATE: January 16, 1974

TO: Distribution

FROM: R. P. Hearn *RPH* Manager, Site Engineering

SUBJECT: ANL-West Sanitary Sewage Treatment Expansion Preliminary Proposal

Transmitted herewith for your review and comments is the Preliminary Proposal for the above project.

You or your authorized representative are invited to attend an approval meeting which will be held in the Site Engineering Conference Room on January 29, 1974, at 2:00 P.M. Your approval signature may be requested at this meeting after all review comments have been discussed and resolved.

Unless we receive comments prior to the meeting and you are absent from the meeting, we will assume that you have no comments and approve the Preliminary Proposal.

RPH:MWJ:jl

Attachments

Distribution:

C. S. Abrams
J. W. Auer
R. L. Black
J. I. Burt ✓
E. D. Graham/L. Witbeck/F. J. Sommers/D. Helmer
M. W. Jackson
B. H. Johnson
W. C. Persky
R. J. Teunis
R. C. Watson
D. F. Wood
File S.R. 80733

PRELIMINARY PROPOSAL
FOR
ANL-W SANITARY SEWAGE TREATMENT EXPANSION
FOR
ARGONNE NATIONAL LABORATORY
AT
NATIONAL REACTOR TESTING STATION
IDAHO FALLS, IDAHO
January 16, 1974

A. DESCRIPTION OF WORK

1. General

The ANL-West Sanitary Sewage Treatment Expansion consists of the construction of a 1-acre lagoon with impervious liner north of the present two lagoons, relocation of connecting pipes, installation of aeration equipment, and installation of cascades between the new and existing lagoons with alternate flow paths for summer and winter operations.

2. Detailed Description

The evaporation area of the existing evaporation lagoons will be expanded by the construction of an adjoining lined lagoon with an additional evaporation area of approximately one acre. The evaporation area fluctuates with changes of the level of the surface of the lagoon. The new construction will approximately double the present evaporation area. The new lagoon will require excavation of soil, placing of compacted fill around the lagoon area with a width suitable for operation of a vehicle if and when necessary.

The two existing lagoons and the new lagoon will be connected by concrete cascades which will permit some aeration of the liquid in moving between each lagoon. The cascade will consist of a reinforced concrete flat-bottom channel with cobblestones set in the concrete to increase the roughness. Thus each lagoon will be operated at a level such that the liquid flows over the cascade into the next lagoon.

Each lagoon will also be connected to the next in line with a culvert and headgate. This will require installation of a headgate between the two existing lagoons, and the installation of a culvert and headgate to the new lagoon. The lagoons will normally be operated with the

headgate closed and all liquid flowing over the cascade. Under severe winter conditions when there is hazard of the cascade building up with ice to the extent that the lagoon would overflow, the headgates would be opened to permit flow from one lagoon to the other below the ice surface lowering the level of the inlet lagoon.

A new inlet diverter will be installed over the existing pumped inlet line to assist in spreading and aerating the inlet flow. This diverter will consist of a steel grid supported on legs with steel bearing plates flat on the bottom of the existing lagoon lining. The diverter will be placed approximately 2 feet above the existing discharge point but below the surface of the lagoon. Surges of liquid mixed with air will be broken up as the surges impinge on the diverter. Where some of the openings in the diverter become clogged or reduced by a build-up of solid matter in the sewage, the air and sewage will be diverted over a wider area and eventually around the projecting edges of the diverter grid. The diverter will be replaceable.

Compressed air will be introduced into the pumped sewage line at the existing pump house. A small air compressor will be placed in the pump house and operated simultaneously with the sewage pump. The compressed air will assist in oxidation of the sewage to some extent and introduce turbulence at the discharge point in the existing lagoon assisting in the mixing action of the raw sewage with the material exposed to biodegradation in the lagoon.

The existing dirt and gravel roadway will be paved from the existing Security Fence line to the lagoon to provide all-weather access for surveillance, monitoring, and maintenance operations.

An animal-control fence will be placed around the lagoons to prevent access by stray cattle, sheep, antelope, and coyotes. It will be a five-foot-high wire mesh fence with no barbed wire and one manual truck gate.

3. Preliminary Plans

The following drawing is attached showing the principal features of the proposed construction:

Drawing No.

B. SAFETY CONSIDERATIONS

The proposed facility is basically a holding area for the evaporation of sewage to prevent the sewage being discharged to the underground water table approximately 600 feet below ground.

1. Analysis of Principal Hazards and Risks

a. Potential Injury and Property Damage

(1) Fire

None. There is no combustible construction proposed and no combustible fluids to be processed.

(2) Explosion

The likelihood of explosion occurring within this facility is considered nil.

(3) Radiation

Potential loss resulting from radiation is considered negligible. Radiation exposure would occur from radioactive contamination of sewage. Potential loss to this facility resulting from radiation emanating from adjacent facilities is discussed in the Hazard Summary Report, Experimental Breeder Reactor II, ANL-5719.

(4) Structural Failure

The potential for structural failure is very low from severe winds or ice conditions which could result in bank erosion.

(5) Seismic Activity

The potential loss due to seismic activity is negligible and would not result in any likelihood of personnel injury.

b. Predicted Consequences

(1) Fire

None.

(2) Explosion

None.

(3) Radiation

Uncontrolled release of radiation could cause severe personnel injury or even death. This includes not only operating personnel, but any other person within reach of the effects of radiation. It could also result in pollution of the immediate ground surface, and the air surrounding.

In the event of exposure or contamination spread exceeding administrative control limits, there could be delay in operations due to time required for training additional personnel and/or delay in work for decontamination of the facility.

(4) Structural Failure

Embankments will be constructed to same standards that have resulted in satisfactory performance of the existing lagoons.

(5) Seismic Activity

It is predicted that, should an earthquake occur, damage would be limited to disturbance of lagoon embankments.

c. Preventive Measures

(1) Fire

Construction materials will be non-combustible.

The external area is protected by existing fire fighting forces which are located in the immediate vicinity and are equipped to respond quickly to alarms.

A.E.C. fire department procedures provide additional assistance when the crew at the ANL-West Site is occupied with one emergency.

(2) Explosion

Administrative controls prohibit introduction of explosive fluids into the Sanitary Sewage System.

(3) Radiation

The Sanitary Sewage System is monitored in the existing pump house to detect any uncontrolled release or discharge of radiation in the system.

Radiological control procedures will be in accordance with the requirements of the ANL-W Health and Safety Manual.

(4) Structural Failure

Embankment construction will be in accordance with Idaho Highway Department Standards.

(5) Seismic Activity

The design and construction where applicable will be accomplished in accordance with Uniform Building Code, Seismic Zone 3.

C. ENVIRONMENTAL CONSIDERATIONS

1. Construction Work

- a. The potential pollutants resulting from the proposed construction work per se will be:
 - (1) Construction debris and litter.
 - (2) Gaseous exhaust from construction machinery (i.e., carbon monoxide, sulfur dioxide, hydrocarbons, etc.).
 - (3) Noise from construction.
- b. The proposed treatment and control methods with respect to these potential pollutants include:
 - (1) Removal of debris in accord with practices established at ANL-West and stipulated in the General Conditions of the construction subcontract.
 - (2) The periodicity of gaseous exhausts based on the 8-hour day average releases, plus the small increments of these exhausts, imply no need for special or unusual method of control.
 - (3) Noise levels (associated with normal construction activity) are not expected to exceed the 85 decibel level; hence, no special controls are considered.

2. Potential Environmental Impact

The potential interaction with the environment from activities related to the Sanitary Sewage Treatment expansion occurs in the confinement of the sewage effluent to permit it to evaporate without seepage to the underground water table. The existing lagoons are intended to provide complete evaporation, but due to growth of the ANL-West Site population the capacity is exceeded at times. At such times it is necessary to lower the level of the existing lagoons by pumping or spraying the material on the surrounding desert area, a disposal method not contemplated in the original construction. This pumping or spraying is not necessarily injurious to the environment but subject to the criticism that it could result in dispersion of disease-causing organisms ~~or dispersion of some nominal radiological contamination in the sewage lagoon~~. Complete control of the sewage within the boundaries of the engineered lagoons and disposal of the liquid by evaporation will reduce potential environmental problems.

3. Alternatives to the Proposed Action

Alternatives to the proposed action would be the construction of a complete 3-stage sewage treatment system or simple discharge of sewage to the ground. The first would be economically unacceptable due to cost, and the second would be environmentally hazardous.

4. Cumulative and Irreversible and Irretrievable Commitments

Cumulative and irreversible and irretrievable commitments of resources involved in the implementation of this proposed action will be minimal and limited to loss of about 1-1/2 acres from the desert environment for the life of the facility.

5. Conflicts with State Plans or Programs

There are no known potential conflicts with local, state, or regional ordinances, plans, or programs.

6. Anticipated Benefits vs. Environmental and Other Costs

The primary anticipated benefit resulting from implementing the proposed plan will be the added evaporation area for disposal of sewage.

It has been concluded that the anticipated benefits outweigh the expected economic and environmental costs, which include loss of about 1-1/2 acres of desert land area.

D. JUSTIFICATION OF BASIC NEED

The existing lagoon sanitary sewage treatment facility was sized for utilization by approximately 200 people. At the time of construction in 1965 the site population was 300, with sanitary sewage for one area treated in a separate Imhoff tank and leaching pit. Subsequently the Imhoff tank-leaching pit was abandoned because of obnoxious odors, and flow diverted to the lagoon because the lagoon appeared to have sufficient capacity above the 200-design to accommodate flow for 300-400 persons. The present site population of 650 people has overloaded the lagoon treatment facility to the point that liquid effluent must be discharged to the surrounding land with less than 60 percent BOD removal and one to two p.p.m. dissolved oxygen content.

The current Idaho State Board of Health "Rules and Regulations for the Establishment of Standards of Water Quality and for Waste Water Treatment Requirements for Waters of the State of Idaho" states that "...where a higher standard can be achieved, the highest and best practicable treatment... shall be provided so as to maintain... coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, and other deleterious factors at the lowest desirable levels." In addition, the regulations state that the "minimum adequate treatment for domestic sewage or industrial wastes containing significant organic material shall be equal to that which is commonly known as secondary treatment or the equivalent of 85 percent removal of the BOD including adequate disinfection of any wastes which may contain organisms that may produce disease in man or animals."

The U.S.A.E.C. Idaho Operations Office states that "in keeping with the intent of AECM 0510, it will be the policy of ID to cooperate with the Idaho State Board of Health and the Idaho Department of Health to the extent practicable and within available appropriations in assuring compliance with the regulations."

Installation of the proposed aerated lagoon, when used in conjunction with the existing structures, will produce an effluent that will meet the requirements of the Idaho State Board of Health.

E. CONSIDERATION GIVEN TO EXISTING STRUCTURES AND COMMERCIAL-INDUSTRIAL SOURCES

There are no existing structures or commercial-industrial sources within a reasonable distance to provide evaporation area or mechanical evaporation facilities for the sewage.

F. RELATIONSHIP TO PROJECT AND PROGRAM

This facility is required to support LMFBF program activities required at the ANL-West Site.

G. METHOD OF ACCOMPLISHMENT

Engineering will be performed by Laboratory personnel. Construction will be accomplished by a Laboratory-administered, lump-sum construction subcontract.

H. OUTLINE SPECIFICATIONS

1. General Construction

a. Codes and Standards

Uniform Building Code

American Concrete Institute

American Society for Testing and Materials

Idaho Department of Highways Specifications

b. Lagoon Construction

Embankments will be compacted earth. Slopes and bottom of lagoon will be sealed with plastic film or Hypalon liner.

Lagoon slopes will be riprapped with hand-placed cobblestones. Cascades will be reinforced concrete with cobblestones for increasing the roughness of surfaces. Asphaltic road paving materials will conform to Idaho Highway Specifications Section F02.

The air compressor to be installed at the Sanitary Sewage Lift Station shall be a 10 cfm, 208 volts, 50 psig, continuous-duty, oil-free compressor.

The animal control fence will be five feet high, 11 gauge wire mesh, galvanized, with no barbed wire. One manual truck gate, 12'-0" wide, will be provided at the road for access to the lagoon areas.

I. COST ESTIMATE

The total estimated cost of performing the work as shown on the attached Cost Estimate Summary is \$110,000.

J. SCHEDULE

	<u>Start</u>	<u>Complete</u>
Title I Engineering	Dec., 1973	Jan., 1974
Title II Engineering	March, 1974	April, 1974
Solicit Bids	April, 1974	April, 1974
Award	April, 1974	May, 1974
Construction	May, 1974	Sept., 1974
Title III Engineering	May, 1974	Oct., 1974

K. SOURCE OF FUNDS

Funds for this project are available from those allocated for FY-1974 General Plant Projects.

COST ESTIMATE SUMMARY

ANL-West Sanitary Seware Treatment Expansion
Project Title and Building Number

W.P. _____ S.R. _____

Date January 15, 1974

ITEM				Subtotal	Total
A. ENGINEERING					
	Title I	Title II	Title III		
1. ANL	\$2,000.	\$10,000.	\$3,500.	\$	
2. A-E	\$	\$	\$	\$	
TOTAL ENGINEERING					\$15,500.
B. CONSTRUCTION (Include removal costs less salvage value)					
1. Improvements to Land <input type="checkbox"/> Walks <input checked="" type="checkbox"/> Roads <input checked="" type="checkbox"/> Fences					
<input type="checkbox"/> Other Roadway, \$6,600 Fences \$12,400.				\$ 19,000.	
2. Building (For new space show area, volume, etc.)					
Gross Area _____ s.f. @ \$		AMOUNT (DOLLARS)			
Gross Vol. _____ c.f. @ \$		Remod.	New Space		
a. Structure					
b. Mechanical					
(1) Plumbing					
(2) Heating					
(3) Ventilating					
(4) Air Conditioning					
(5)					
Total Mechanical					
c. Electrical					
(1) Power					
(2) Light					
(3) Alarms					
(4) Communications					
(5)					
Total Electrical					
Total Building Costs ..				\$	
3. Other Structures (Retention basins, pits, towers, stacks, etc., when not a part of a building)					
a.				\$	
4. Special Facilities & Equipment (Reactor vessels, high vacuum systems, accelerator components, shielding, waste disposal systems, air- and water-pollution control)					
a.				\$ 57,000.	
5. Utility Services & Mains (Beyond 5 ft of Building)					
a. Water					
b. Sewer					
c. Steam					
d. Electrical					
e.					
Total Utilities				\$	
6. Standard Equipment (Office, cafeteria, lab furniture, etc.)					
a.				\$	
TOTAL CONSTRUCTION					\$ 76,000.

2. TOTAL ENGINEERING AND CONSTRUCTION BROUGHT FORWARD \$ 91,500.
- C. ANL SHOPS (Indicate type of work to be done) \$ _____
- D. PROCUREMENT (Include actual costs for obtaining excess property) \$ _____
- E. CONTINGENCY: Engr. \$ 3,000. Constr. \$ 15,500. Procur. \$ _____ Total .. \$ 18,500.
- F. INDIRECT COSTS (Include Above) O&P 38.5 % Pay. & Perf. Bond 1.5 %
- G. SUBTOTAL (Funds Required) \$ 110,000.
- H. EXCESS OR SALVAGED PROPERTY (Non-Fund)

I. RECAPITULATION

<u>ITEM</u>	<u>AEC</u>	<u>ANL</u>	<u>TOTAL</u>
ENGINEERING	\$ _____	\$ <u>15,500.</u>	\$ <u>15,500.</u>
CONSTRUCTION CONTRACT	\$ _____	\$ <u>76,000.</u>	\$ <u>76,000.</u>
ANL SHOPS	\$ _____	\$ <u>0</u>	\$ <u>0</u>
PROCUREMENT	\$ _____	\$ <u>0</u>	\$ <u>0</u>
CONTINGENCY	\$ _____	\$ <u>18,500.</u>	\$ <u>18,500.</u>
SUBTOTAL (Funds Required)	\$ _____	\$ <u>110,000.</u>	\$ <u>110,000.</u>

EXCESS OR SALVAGED PROPERTY (Non-Fund)	_____	<u>0</u>	_____
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TOTAL PROJECT ESTIMATED COST	\$ _____	\$ <u>110,000.</u>	\$ <u>110,000</u>
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J. BIDDING ALTERNATES

Item Description

ADD (+) OR
DEDUCT (-)

\$ _____
\$ _____
\$ _____
\$ _____
\$ _____

K. FUNDING DETERMINATION

1. <u>Plant Additions</u>	\$ _____
2. <u>Equipment</u> (Including Installation)	\$ _____
3. <u>Repairs</u>	\$ _____
4. <u>Spare Parts</u>	\$ _____
5. <u>Removal of Existing Plant or Equipment</u>	\$ _____
6. <u>Relocation of Plant or Equipment</u>	\$ _____
TOTAL (Exclusive of Engineering and Contingency)	\$ _____
7. <u>Estimated Value (i.e., Current Replacement Cost)</u> <u>of Plant Assets Removed or Banded</u>	\$ _____

L. REMARKS: